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follows: Chicago, 10; Detroit, 10; Knoxville, 6; Memphis, 8; Milwaukee, 8; Zanesville, Ohio, 7. For the week ended February 8: Baltimore, 9; Milwaukee, 13.

CONTAMINATION OF FOOD SUPPLIES.

THE VALUE OF PROTOZOA AS AN AID IN DETERMINING FECAL CONTAMINATION OF THE FOOD SUPPLY.

By CH. WARDELL STILES, Professor of Zoology, Hygienic Laboratory, United States Public Health Service.

In an effort to find a method to determine the existence or probable existence of fecal contamination of food, the idea presented itself that a practical test of relatively simple application seemed to be found in the presence of certain protozoa in the stools of persons of any given locality. Three protozoa in particular come into consideration, namely, *Entameba coli, Lamblia duodenalis,* and *Trichomonas intestinalis.*

All three of these organisms live in the intestine of man, and all three possess a spore stage that can be recognized by microscopic examination of the stools. As all three are, according to our present knowledge, obligatory parasites, their presence in a given person is presumptive evidence that the person in question received his infection from a preexisting infection in some other person. As these parasites or their spores are discharged from the body in the fecal material, the conclusion seems justified that the dejecta form the source of infection.

That flies breed in and feed upon human feces is a fact so well established that it needs no further argument. That the flies thus breeding and feeding visit houses and carry fecal contamination to the food is a conclusion based in part on circumstantial evidence and supported by observation and experiment. That these flies could easily carry the minute spores of the protozoa under discussion can hardly be questioned, although the possibility does not seem entirely excluded that the spores might also be blown around as dust from dried night soil and thus reach the food through aerial contamination.

Given now the facts (1) that we are dealing with obligatory parasites, (2) that the presence of these parasites in a person presupposes a preexisting intestinal infection in some other individual, (3) that they are discharged from the bowels in the feces, (4) that their spores are small enough to be carried by flies (possibly also as dust in the air), (5) that flies breed in and feed upon fecal material and are known to carry contamination to food, the conclusion seems justified that according to our present knowledge the presence of *Entameba coli,* of *Lamblia duodenalis,* or of *Trichomonas intestinalis* in a person may be accepted as evidence that the person in question has swallowed material that has come from the bowels of some other person.

In this connection it may be mentioned that it is not rare to find from 10 to 40 or 60 per cent of the samples of feces examined in some localities to contain spores of one or another of the protozoa in question.

The practical application of these facts from a public health point of view is this: If any one of these parasites is found in a person, we are in a position to state to him definitely that we have positive evidence that he has swallowed material that has been contaminated with fecal matter, and if we find poor privy and fly conditions on or near his premises, we can state to him that the conditions in question are favorable to such contamination, and may explain the infection; also that it is a mere matter of chance that he has become infected with a relatively harmless parasite instead of with typhoid fever or dysentery.

It is self-understood that the possibility is not excluded that the infection was contracted in food shipped from some farm or from a distance, but the moral effect of the demonstration of infection and the possibility of its continuance may be expected to induce people to clean up the back yard.

TYPHOID FEVER.

A REPORT OF AN OUTBREAK AT FORT DODGE, IOWA.

By P. M. CARRINGTON, Surgeon, United States Public Health Service.

At the request of the State board of health of Iowa, the writer was directed by the Surgeon General to proceed to Fort Dodge, in that State, for the purpose of investigating an outbreak of typhoid fever, "especially with reference to the origin and prevalence of the disease," and was directed to advise the authorities in regard to its control, and in accordance with said orders arrived at Fort Dodge on October 28, 1912. The investigation was concluded November 8, 1912.

The town of Fort Dodge is situated about 80 miles northwest of Des Moines, on the Des Moines River, from which it in part derives its water supply and into which it discharges its sewage. Its situation is hilly, with good natural drainage in the direction of the river. The population is between 15,000 and 17,000. There are large deposits of gypsum in the vicinity and numerous mills for the manufacture of plaster of Paris and other products of gypsum.

The rock formation underlying the region is extensively fissured. Soldier Creek flows in a southwesterly direction through the northern section of the town, and empties into the Des Moines River just above the waterworks, but below the filter beds.